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IMMUNOTOXICITY OF PYRENE AND PHENANTHRENE IN EMBRYONATED CHICKEN EGGS

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Abstract

Pyrene and phenanthrene are members of polycyclic aromatic hydrocarbons (PAHs) which are ubiquitous environmental pollutant as a result of incomplete combustion of organic matter. Many PAHs are highly toxic, teratogenic, mutagenic, carcinogenic and immunosuppressive to animals and humans. However, toxicity data for pyrene (Py) and phenanthrene (Ph) are still limited especially for the concerns of the poultry industry. This study aimed to investigate the effects of Py and Ph in inducing immunotoxicity to the chicken embryos. Fifty 10-day-old embryonated chicken eggs were divided randomly into control, Py and Ph groups. The Py and Ph were inoculated into the embryonated chicken eggs at a dose of 15 mg/kg via the allantoic route, while the control group remained non-inoculated. All embryonated chicken eggs were incubated at 37°C and candled daily to observe for the embryonic mortality. After 11 days of incubation, sera were collected from the day-old chicks and the yolks collected from the dead embryos for the haemagglutinin-inhibition (HI) test to determine the Newcastle disease (ND) antibody titer. Then, all chick embryos were necropsied and lymphoid organs including thymus, spleen and bursa of Fabricius collected for histopathology examination. The chickens from the Py and Ph groups showed severe lymphocyte depletion in the thymus, spleen and bursa of Fabricius. Such changes in the lymphoid organs had led to decrease in antibody production in the treated chicks. The controls were not affected. This study showed that Py and Ph were able to cross the allantoic barrier or *in ovo* and be transfered to the chick embryos to induce immunosuppression by damaging the lymphoid organs.

Keywords: pyrene, phenanthrene, polycyclic aromatic hydrocarbons (PAHs), immunotoxicity, chick embryo